

CLAIMS

1. A heating unit for use in a continuous casting installation, said heating unit including a heating chamber for liquid metal having an inlet and an outlet, the heating chamber being constructed and arranged for a continuous flow of liquid metal through the chamber from the inlet to the outlet, and at least one thermostatically controllable electrical resistance heating element mounted within the heating chamber below the level of the outlet, said heating element being constructed and arranged to heat liquid metal flowing through the chamber to a predetermined liquid metal temperature.
2. A heating unit according to claim 1, wherein each said electrical resistance heating element is enclosed within a protective element made of a refractory material.
3. A heating unit according to claim 2, wherein the protective element includes a sealed protective sleeve.
4. A heating unit according to any one of the preceding claims, wherein the heating chamber is elongate, and the inlet and the outlet are located towards opposite ends thereof.
5. A heating unit according to claim 4, wherein said at least one heating element is elongate and is mounted lengthways within the heating chamber.
6. A heating unit according to any one of the preceding claims, including at least one temperature sensor.
7. A heating unit according to claim 6, wherein a temperature sensor is arranged to sense the temperature of liquid metal adjacent the outlet.
8. A heating unit according to any one of the preceding claims, wherein the heating chamber has a refractory liner.
9. A heating unit according to any one of the preceding claims, including a lid for the heating chamber.

10. A heating unit according to any one of the preceding claims, including a drain outlet for the heating chamber.
11. A heating unit according to any one of the preceding claims, including a filter chamber.
12. A heating unit according to claim 11, including a transfer conduit connecting the filter chamber and the heating chamber.
13. A heating unit according to claim 11 or claim 12, wherein the filter chamber is located upstream of the heating chamber.
14. A heating unit according to any one of claims 11 to 13, including a ceramic foam filter mounted in the filter chamber.
15. A heating unit according to any one of claims 11 to 14, including a lid for the filter chamber.
16. A heating unit according to any one of claims 11 to 15, including a drain outlet for the filter chamber.
17. A casting installation for use in a continuous casting process, the installation including a furnace for heating metal to a first liquid metal temperature, a casting machine including a pair of casting rollers and a nozzle arranged to deliver liquid metal into a nip between the casting rollers, such that the metal solidifies as it passes through the nip, a feed line for supplying liquid metal from the furnace to the casting machine, and a heating unit located in the feed line between the furnace and the casting machine, said heating unit being thermostatically controlled and arranged to heat the liquid metal to a second liquid metal temperature; characterised in that the heating unit includes a heating chamber for liquid metal having an inlet and an outlet, the heating chamber being constructed and arranged for a continuous flow of liquid metal through the chamber from the inlet to the outlet, and at least one thermostatically controllable electrical resistance heating element mounted within the heating chamber below the level of the outlet.
18. A casting installation according to claim 17, including a degassing unit.

19. A casting installation according to claim 18, wherein the heating unit is downstream of the degassing unit.
20. A casting installation according to any one of claims 17 to 19, including a filter unit.
21. A casting installation according to claim 20, wherein the heating unit is downstream of the filter unit.
22. A casting installation according to any one of claims 17 to 21, wherein the casting machine includes a headbox and the heating unit is upstream of the headbox.
23. A casting installation according to any one of claims 17 to 22, including a thermostatic control device for controlling the heating unit.
24. A casting installation according to any one of claims 17 to 23, wherein the heating unit is as defined by any one of claims 1 to 16.
25. A continuous casting process, the process including the steps of heating a metal in a furnace to a first liquid metal temperature, supplying the liquid metal through a feed line from the furnace to a casting machine that includes a nozzle and a pair of casting rollers, and delivering the liquid metal through the nozzle into a nip between the casting rollers so that the metal solidifies as it passes through the nip; characterised in that the liquid metal is heated to a second liquid metal temperature in a thermostatically controlled heating unit located in the feed line between the furnace and the casting machine; said heating unit including a heating chamber for liquid metal having an inlet and an outlet, the heating chamber being constructed and arranged for a continuous flow of liquid metal through the chamber from the inlet to the outlet, and at least one thermostatically controllable electrical resistance heating element mounted within the heating chamber below the level of the outlet.
26. A process according to claim 25, including the step of degassing the liquid metal.
27. A process according to claim 26, wherein the liquid metal is heated to the second liquid metal temperature after the degassing step.

28. A process according to any one of claims 25 to 27, including the step of filtering the liquid metal.
29. A process according to claim 28, wherein the liquid metal is heated to the second liquid metal temperature after the filtering step.
30. A process according to any one of claims 25 to 29, in which the second liquid metal temperature lies in the range 600-800°C, preferably 650-750°C, more preferably 680-720°C.
31. A process according to any one of claims 25 to 30, in which the liquid metal is heated in the heating unit to produce a temperature rise in the range 0-50°C, preferably 0-20°C, more preferably 0-10°C.
32. A process according to any one of claims 25 to 31, including the step of sensing the temperature of the liquid metal and controlling the heating unit according to the sensed temperature.
33. A process according to claim 32, in which the temperature of the liquid metal is sensed at an outlet of the heating unit.
34. A process according to claim 32 or claim 33, in which the temperature of the liquid metal is sensed at an inlet of the heating unit.
35. A process according to any one of claims 25 to 34, wherein liquid metal is retained in the heating unit at the end of a casting run, and the retained metal is maintained in a liquid state by heating the metal in the heating unit.
36. A process according to claim 35, wherein the depth of the retained metal is sufficient to cover the at least one heating element.